# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

## TRIMESTER 2, 2019/2020

## BFS1024 – STATISTICS FOR FINANCE
( All sections / Groups )

09 MARCH 2020
9.00 a.m. - 11.00 a.m.
(2 Hours)

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**INSTRUCTIONS TO STUDENTS**

1. This question paper consists of **9 pages** including statistical formulas and statistical tables with **4 questions** only.

2. Attempt **ALL** questions and write your answers in the Answer Booklet provided.

3. Students are allowed to use non-programmable scientific calculators that are permitted to be used in the examination.

## Question 1 (30 Marks)

Some mutual funds can be purchased directly from bank or other financial institutions. Others must be purchased through brokers who charge a fee for this service. A group of researchers randomly sampled 20 net annual returns (in %) that have been acquired directly and also that are bought through brokers as follows:

| Direct | | | | | Broker | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 9.33 | 12.61 | 4.23 | 14.69 | 10.29 | 3.24 | 18.22 | 0.19 | 4.36 | 9.43 |
| 13.57 | 3.09 | 10.28 | -0.24 | 4.39 | -6.76 | 6.87 | -11.07 | 1.57 | 8.31 |

a) For each of the channels for purchasing mutual funds, determine the mean, median and standard deviation of net annual return for each group. [12 marks]

b) Using the values obtained in (a), compare the relative dispersion of annual returns between these two channels? [6 marks]

c) At the 5% significance level, can we conclude that directly purchased mutual funds outperform mutual funds bought through brokers? [12 marks]

## Question 2 (25 Marks)

a) An aerospace company has submitted bids on two government defense contracts. The company president believes that there is 45% probability of winning the first contract. If they win the first contract, the probability of winning the second contract is 65%. However, if they lose the first contract, the president thinks that the probability of winning the second contract decreases to 50%.

  i. Draw a tree diagram with its probabilities which describe the above scenario.
[6 marks]
  ii. What is the probability of winning the first contract if they win the second contract? [5 marks]

b) Every day a baker prepares its famous rye bread. His assistant determined that daily demand is normally distributed with a mean of 850 loaves and a standard deviation of 90 loaves.

  i. Find the probability that the total demand for a particular day is between 800 to 1000 loaves. [5 marks]
  ii. How many loaves should the baker make if he wants to avoid the shortage of bread on any day to be no more than 30%? [5 marks]

**Continued...**

c) Complaints about an internet brokerage firm occur at a rate of five per day. The number of complaints appears to be Poisson distributed. Find the probability that the firm receives less than 2 complaints within 9am to 5pm on a particular day.

[4 marks]

## Question 3 (20 Marks)

a) A parking control officer claimed that most of the cars parked less than half an hour. He conducts an analysis of the amount of time shown on parking meters. A quick survey of 15 cars that have just left their metered parking spaces produced a mean of 18 minutes and a standard deviation of 9.75 minutes. At 10 percent significance level, is there any sufficient evidence to support his claim?                    [10 marks]

b) The Reliance Insurance Company interested to investigate on annual claimant satisfaction of its policyholders. A random sample of 60 claimants was asked to rate their satisfaction with the quality of the service; satisfied or unsatisfied. 51 of them were satisfied with the service.

   i. Construct a 90% confidence interval estimate for the proportion of claimants who were satisfied with the service provided by the company.            [6 marks]

   ii. Suppose that the auditor committee wants to conduct another study from other branch of this company. Using sample proportion in (i), what is the required sample size to estimate the population proportion to within $\pm 4\%$ with 95 percent confidence?                    [4 marks]

**Continued...**

## Question 4 (25 Marks)

A developer wants to forecast the value of lots for a large tract of land adjoining a lake. From previous experience, she knows that the most important factors affecting the price of lot (in RM '000) are its size (in '000 sqft), number of mature trees and distance to the lake (in feet). From the nearby area, she gathered the relevant data and analysed it. From the analysis, the summary of regression output was presented as below:

ANOVA

|  | df | SS | MS |
|---|---|---|---|
| Regression | 3 | 29029.72 | 9676.572 |
| Residual | 56 | 90694.33 | 1619.542 |
| Total | 59 | 119724 |  |

|  | Coefficients | Standard Error |
|---|---|---|
| Intercept | 51.39122 | 23.5165 |
| Lot_Size | 0.699904 | 0.558855 |
| Trees | 0.678813 | 0.229306 |
| Distance | -0.37836 | 0.195237 |

a)  Develop an estimated multiple linear regression equation for the above data.

[4 marks]

b)  Interpret the slope coefficient of distance to the lake relating to the price of lot.

[2 marks]

c)  Compute the adjusted R-square and interpret its meaning.          [6 marks]

d)  At the 10% level of significance, test the significance of each factor in estimating the price of the lot in this model. Which of the factors is significant?          [9 marks]

e)  Predict the selling price of a 45,000-square-foot lot that have 12 mature trees and are 75 feet from the lake.          [4 marks]

**End of Question**

## A.      DESCRIPTIVE STATISTICS

$$\text{Mean} = \frac{\sum X_i}{n}$$

$$\text{Standard Deviation (s)} = \sqrt{\frac{\sum X^2}{n-1} - \frac{(\sum X)^2}{n(n-1)}}$$

$$\text{Pearson's Coefficient of Skewness (S}_k) = \frac{3(\overline{X} - \text{Median})}{s} \text{ or } \frac{\overline{X} - \text{Mode}}{s}$$

## B.      PROBABILITY

P (A or B) = P (A) + P (B) - P (A and B)

P (A and B) = P (A) P (B) if A and B are independent

P (A | B) = P (A and B) / P (B)

**Poisson Probability Distribution**

If X follows a Poisson Distribution P ( $\lambda$ ) where $P(X = x) = \dfrac{e^{-\lambda}\lambda^x}{x!}$

then the mean = E(X) = $\lambda$ and variance = VAR(X) = $\lambda$

**Binomial Probability Distribution**

If X follows a Binomial Distribution B(n, p) where $P(X = x) = {}^nC_x p^x q^{n-x}$

then the mean = E(X) = n p and variance = VAR(X) = npq where q = 1 - p

**Normal Distribution**

If X follows a Normal distribution N( $\mu$ , $\sigma$ ) where E(X) = $\mu$ and VAR(X) = $\sigma^2$

then $z = \dfrac{X - \mu}{\sigma}$

## C.      EXPECTATION AND VARIANCE OPERATORS

E (X) = $\sum[X \bullet P(X)]$

VAR (X) = $E(X^2) - [E(X)]^2$

If E (X) = $\mu$ then E (kX) = k $\mu$, E(X + Y) = E(X) + E(Y)

If VAR (X) = $\sigma^2$ then VAR (kX) = $k^2 \sigma^2$,

VAR (aX + bY) = $a^2$VAR(X) + $b^2$VAR(Y) + 2ab COV(X, Y)

where COV(X, Y) = E(X Y) – [E(X) E(Y)]

## D.    CONFIDENCE INTERVAL ESTIMATION AND SAMPLE SIZE DETERMINATION

(100 - α) % Confidence Interval for Population Mean (σ Known) = $\overline{X} \pm Z_{\alpha/2}\left(\dfrac{\sigma}{\sqrt{n}}\right)$

(100 - α)% Confidence Interval for Population Mean (σ Unknown) = $\overline{X} \pm t_{\alpha/2,n-1}\left(\dfrac{s}{\sqrt{n}}\right)$

(100 - α)% Confidence Interval for Population Proportion = $p \pm Z_{\alpha/2}\sqrt{\dfrac{p(1-p)}{n}}$

Sample Size Determination for Population Mean = $n \geq \dfrac{(Z_{\alpha/2})^2 \sigma^2}{E^2}$

Sample Size Determination for Population Proportion = $n \geq \dfrac{(Z_{\alpha/2})^2 p(1-p)}{E^2}$

Where E = Limit of Error in Estimation

## E.    HYPOTHESIS TESTING

| One Sample Mean Test | |
|---|---|
| **Standard Deviation (σ) Known** | **Standard Deviation (σ) Not Known** |
| $Z = \dfrac{\overline{x} - \mu}{\sigma / \sqrt{n}}$ | $t = \dfrac{\overline{x} - \mu}{s / \sqrt{n}}$ |
| **One Sample Proportion Test** | |
| $Z = \dfrac{p - \pi}{\sqrt{\dfrac{\pi(1-\pi)}{n}}}$ | |

**Two Sample Mean Test**

**Standard Deviation ($\sigma$) Known**

$$z = \frac{(\overline{x_1} - \overline{x_2})}{\sqrt{\sigma_1^2 / n_1 + \sigma_2^2 / n_2}}$$

**Standard Deviation ($\sigma$) Not Known**

$$t = \frac{(\overline{x_1} - \overline{x_2})}{\sqrt{S_p^2 \left( 1/n_1 + 1/n_2 \right)}} \text{ where } S_P^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 - 1) + (n_2 - 1)}$$

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**Two Sample Proportion Test**

$$z = \frac{(p_1 - p_2)}{\sqrt{p(1-p)\left[ \frac{1}{n_1} + \frac{1}{n_2} \right]}} \text{ where } p = \frac{(n_1 p_1) + (n_2 p_2)}{n_1 + n_2} = \frac{X_1 + X_2}{n_1 + n_2}$$

where $X_1$ and $X_2$ are the number of successes from each population

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**F.      REGRESSION ANALYSIS**

**SIMPLE LINEAR REGRESSION:**

**Correlation Coefficient**

$$r = \frac{\sum XY - \left[ \frac{\sum X \sum Y}{n} \right]}{\sqrt{\left[ \sum X^2 - \left( (\sum X)^2 / n \right) \right]\left[ \sum Y^2 - \left( (\sum Y)^2 / n \right) \right]}} = \frac{COV(X,Y)}{\sigma_X \sigma_Y}$$

**Regression Coefficient**

$$b_1 = \frac{\sum XY - \left[ \frac{\sum X \sum Y}{n} \right]}{\left[ \sum X^2 - \left( (\sum X)^2 / n \right) \right]} \quad , \quad b_0 = \overline{Y} - b_1 \overline{X}$$

## MULTIPLE LINEAR REGRESSION:

$$\text{Adjusted r-square} = 1 - \left[\frac{(1-r^2)(n-1)}{(n-p-1)}\right] \quad \text{where } p = \text{number of independent variables}$$

**ANOVA Table for Multiple Linear Regression**

| Source | Degrees of Freedom | Sum of Squares | Mean Squares |
|--------|--------------------|----------------|--------------|
| Regression | $p$ | SSR | $MSR = SSR/p$ |
| Error | $n-p-1$ | SSE | $MSE = SSE/(n-p-1)$ |
| Total | $n-1$ | SST | |

**Test Statistic for Significance of the Overall Regression Model** $= F = MSR/MSE$

Test Statistic for Significance of each Explanatory Variable $= t^* = b_i / S_{bi}$ and the

Critical $t = t_{(n-p-1), \alpha/2}$

## TABLE A.1

## Cumulative Standardized Normal Distribution
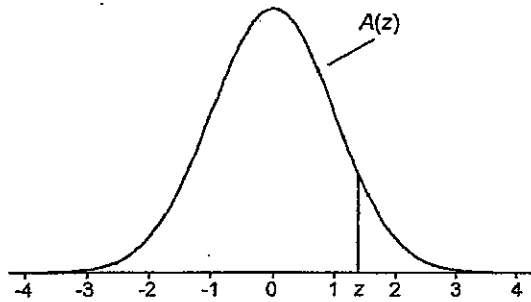


$A(z)$ is the integral of the standardized normal distribution from $-\infty$ to $z$ (in other words, the area under the curve to the left of $z$). It gives the probability of a normal random variable not being more than $z$ standard deviations above its mean. Values of $z$ of particular importance:

| $z$ | $A(z)$ | |
|---|---|---|
| 1.645 | 0.9500 | Lower limit of right 5% tail |
| 1.960 | 0.9750 | Lower limit of right 2.5% tail |
| 2.326 | 0.9900 | Lower limit of right 1% tail |
| 2.576 | 0.9950 | Lower limit of right 0.5% tail |
| 3.090 | 0.9990 | Lower limit of right 0.1% tail |
| 3.291 | 0.9995 | Lower limit of right 0.05% tail |

| $z$ | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.5000 | 0.5040 | 0.5080 | 0.5120 | 0.5160 | 0.5199 | 0.5239 | 0.5279 | 0.5319 | 0.5359 |
| 0.1 | 0.5398 | 0.5438 | 0.5478 | 0.5517 | 0.5557 | 0.5596 | 0.5636 | 0.5675 | 0.5714 | 0.5753 |
| 0.2 | 0.5793 | 0.5832 | 0.5871 | 0.5910 | 0.5948 | 0.5987 | 0.6026 | 0.6064 | 0.6103 | 0.6141 |
| 0.3 | 0.6179 | 0.6217 | 0.6255 | 0.6293 | 0.6331 | 0.6368 | 0.6406 | 0.6443 | 0.6480 | 0.6517 |
| 0.4 | 0.6554 | 0.6591 | 0.6628 | 0.6664 | 0.6700 | 0.6736 | 0.6772 | 0.6808 | 0.6844 | 0.6879 |
| 0.5 | 0.6915 | 0.6950 | 0.6985 | 0.7019 | 0.7054 | 0.7088 | 0.7123 | 0.7157 | 0.7190 | 0.7224 |
| 0.6 | 0.7257 | 0.7291 | 0.7324 | 0.7357 | 0.7389 | 0.7422 | 0.7454 | 0.7486 | 0.7517 | 0.7549 |
| 0.7 | 0.7580 | 0.7611 | 0.7642 | 0.7673 | 0.7704 | 0.7734 | 0.7764 | 0.7794 | 0.7823 | 0.7852 |
| 0.8 | 0.7881 | 0.7910 | 0.7939 | 0.7967 | 0.7995 | 0.8023 | 0.8051 | 0.8078 | 0.8106 | 0.8133 |
| 0.9 | 0.8159 | 0.8186 | 0.8212 | 0.8238 | 0.8264 | 0.8289 | 0.8315 | 0.8340 | 0.8365 | 0.8389 |
| 1.0 | 0.8413 | 0.8438 | 0.8461 | 0.8485 | 0.8508 | 0.8531 | 0.8554 | 0.8577 | 0.8599 | 0.8621 |
| 1.1 | 0.8643 | 0.8665 | 0.8686 | 0.8708 | 0.8729 | 0.8749 | 0.8770 | 0.8790 | 0.8810 | 0.8830 |
| 1.2 | 0.8849 | 0.8869 | 0.8888 | 0.8907 | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| 1.3 | 0.9032 | 0.9049 | 0.9066 | 0.9082 | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| 1.4 | 0.9192 | 0.9207 | 0.9222 | 0.9236 | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| 1.5 | 0.9332 | 0.9345 | 0.9357 | 0.9370 | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| 1.6 | 0.9452 | 0.9463 | 0.9474 | 0.9484 | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |
| 1.7 | 0.9554 | 0.9564 | 0.9573 | 0.9582 | 0.9591 | 0.9599 | 0.9608 | 0.9616 | 0.9625 | 0.9633 |
| 1.8 | 0.9641 | 0.9649 | 0.9656 | 0.9664 | 0.9671 | 0.9678 | 0.9686 | 0.9693 | 0.9699 | 0.9706 |
| 1.9 | 0.9713 | 0.9719 | 0.9726 | 0.9732 | 0.9738 | 0.9744 | 0.9750 | 0.9756 | 0.9761 | 0.9767 |
| 2.0 | 0.9772 | 0.9778 | 0.9783 | 0.9788 | 0.9793 | 0.9798 | 0.9803 | 0.9808 | 0.9812 | 0.9817 |
| 2.1 | 0.9821 | 0.9826 | 0.9830 | 0.9834 | 0.9838 | 0.9842 | 0.9846 | 0.9850 | 0.9854 | 0.9857 |
| 2.2 | 0.9861 | 0.9864 | 0.9868 | 0.9871 | 0.9875 | 0.9878 | 0.9881 | 0.9884 | 0.9887 | 0.9890 |
| 2.3 | 0.9893 | 0.9896 | 0.9898 | 0.9901 | 0.9904 | 0.9906 | 0.9909 | 0.9911 | 0.9913 | 0.9916 |
| 2.4 | 0.9918 | 0.9920 | 0.9922 | 0.9925 | 0.9927 | 0.9929 | 0.9931 | 0.9932 | 0.9934 | 0.9936 |
| 2.5 | 0.9938 | 0.9940 | 0.9941 | 0.9943 | 0.9945 | 0.9946 | 0.9948 | 0.9949 | 0.9951 | 0.9952 |
| 2.6 | 0.9953 | 0.9955 | 0.9956 | 0.9957 | 0.9959 | 0.9960 | 0.9961 | 0.9962 | 0.9963 | 0.9964 |
| 2.7 | 0.9965 | 0.9966 | 0.9967 | 0.9968 | 0.9969 | 0.9970 | 0.9971 | 0.9972 | 0.9973 | 0.9974 |
| 2.8 | 0.9974 | 0.9975 | 0.9976 | 0.9977 | 0.9977 | 0.9978 | 0.9979 | 0.9979 | 0.9980 | 0.9981 |
| 2.9 | 0.9981 | 0.9982 | 0.9982 | 0.9983 | 0.9984 | 0.9984 | 0.9985 | 0.9985 | 0.9986 | 0.9986 |
| 3.0 | 0.9987 | 0.9987 | 0.9987 | 0.9988 | 0.9988 | 0.9989 | 0.9989 | 0.9989 | 0.9990 | 0.9990 |
| 3.1 | 0.9990 | 0.9991 | 0.9991 | 0.9991 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9993 | 0.9993 |
| 3.2 | 0.9993 | 0.9993 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9995 | 0.9995 | 0.9995 |
| 3.3 | 0.9995 | 0.9995 | 0.9995 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9997 |
| 3.4 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9998 |
| 3.5 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 |
| 3.6 | 0.9998 | 0.9998 | 0.9999 | | | | | | | |

# TABLE 10. PERCENTAGE POINTS OF THE $t$-DISTRIBUTION

This table gives percentage points $t_\nu(P)$ defined by the equation

$$\frac{P}{100} = \frac{1}{\sqrt{\nu\pi}} \frac{\Gamma(\tfrac{1}{2}\nu+\tfrac{1}{2})}{\Gamma(\tfrac{1}{2}\nu)} \int_{t_\nu(P)}^{\infty} \frac{dt}{(1+t^2/\nu)^{\frac{1}{2}(\nu+1)}}.$$

Let $X_1$ and $X_2$ be independent random variables having a normal distribution with zero mean and unit variance and a $\chi^2$-distribution with $\nu$ degrees of freedom respectively; then $t = X_1/\sqrt{X_2/\nu}$ has Student's $t$-distribution with $\nu$ degrees of freedom, and the probability that $t \geqslant t_\nu(P)$ is $P/100$. The lower percentage points are given by symmetry as $-t_\nu(P)$, and the probability that $|t| \geqslant t_\nu(P)$ is $2P/100$.
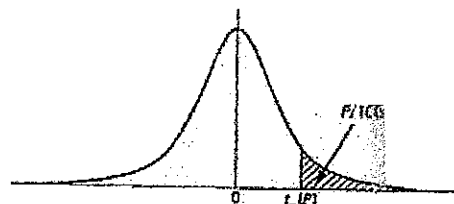
The limiting distribution of $t$ as $\nu$ tends to infinity is the normal distribution with zero mean and unit variance. When $\nu$ is large interpolation in $\nu$ should be harmonic.

| $P$ | 40 | 30 | 25 | 20 | 15 | 10 | 5 | 2·5 | 1 | 0·5 | 0·1 | 0·05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\nu = 1$ | 0·3249 | 0·7265 | 1·0000 | 1·3764 | 1·963 | 3·078 | 6·314 | 12·71 | 31·82 | 63·66 | 318·3 | 636·6 |
| 2 | 0·2887 | 0·6172 | 0·8165 | 1·0607 | 1·386 | 1·886 | 2·920 | 4·303 | 6·965 | 9·925 | 22·33 | 31·60 |
| 3 | 0·2767 | 0·5844 | 0·7649 | 0·9785 | 1·250 | 1·638 | 2·353 | 3·182 | 4·541 | 5·841 | 10·21 | 12·92 |
| 4 | 0·2707 | 0·5686 | 0·7407 | 0·9410 | 1·190 | 1·533 | 2·132 | 2·776 | 3·747 | 4·604 | 7·173 | 8·610 |
| 5 | 0·2672 | 0·5594 | 0·7267 | 0·9195 | 1·156 | 1·476 | 2·015 | 2·571 | 3·365 | 4·032 | 5·893 | 6·869 |
| 6 | 0·2648 | 0·5534 | 0·7176 | 0·9057 | 1·134 | 1·440 | 1·943 | 2·447 | 3·143 | 3·707 | 5·208 | 5·959 |
| 7 | 0·2632 | 0·5491 | 0·7111 | 0·8960 | 1·119 | 1·415 | 1·895 | 2·365 | 2·998 | 3·499 | 4·785 | 5·408 |
| 8 | 0·2619 | 0·5459 | 0·7064 | 0·8889 | 1·108 | 1·397 | 1·860 | 2·306 | 2·896 | 3·355 | 4·501 | 5·041 |
| 9 | 0·2610 | 0·5435 | 0·7027 | 0·8834 | 1·100 | 1·383 | 1·833 | 2·262 | 2·821 | 3·250 | 4·297 | 4·781 |
| 10 | 0·2602 | 0·5415 | 0·6998 | 0·8791 | 1·093 | 1·372 | 1·812 | 2·228 | 2·764 | 3·169 | 4·144 | 4·587 |
| 11 | 0·2596 | 0·5399 | 0·6974 | 0·8755 | 1·088 | 1·363 | 1·796 | 2·201 | 2·718 | 3·106 | 4·025 | 4·437 |
| 12 | 0·2590 | 0·5386 | 0·6955 | 0·8726 | 1·083 | 1·356 | 1·782 | 2·179 | 2·681 | 3·055 | 3·930 | 4·318 |
| 13 | 0·2586 | 0·5375 | 0·6938 | 0·8702 | 1·079 | 1·350 | 1·771 | 2·160 | 2·650 | 3·012 | 3·852 | 4·221 |
| 14 | 0·2582 | 0·5366 | 0·6924 | 0·8681 | 1·076 | 1·345 | 1·761 | 2·145 | 2·624 | 2·977 | 3·787 | 4·140 |
| 15 | 0·2579 | 0·5357 | 0·6912 | 0·8662 | 1·074 | 1·341 | 1·753 | 2·131 | 2·602 | 2·947 | 3·733 | 4·073 |
| 16 | 0·2576 | 0·5350 | 0·6901 | 0·8647 | 1·071 | 1·337 | 1·746 | 2·120 | 2·583 | 2·921 | 3·686 | 4·015 |
| 17 | 0·2573 | 0·5344 | 0·6892 | 0·8633 | 1·069 | 1·333 | 1·740 | 2·110 | 2·567 | 2·898 | 3·646 | 3·965 |
| 18 | 0·2571 | 0·5338 | 0·6884 | 0·8620 | 1·067 | 1·330 | 1·734 | 2·101 | 2·552 | 2·878 | 3·610 | 3·922 |
| 19 | 0·2569 | 0·5333 | 0·6876 | 0·8610 | 1·066 | 1·328 | 1·729 | 2·093 | 2·539 | 2·861 | 3·579 | 3·883 |
| 20 | 0·2567 | 0·5329 | 0·6870 | 0·8600 | 1·064 | 1·325 | 1·725 | 2·086 | 2·528 | 2·845 | 3·552 | 3·850 |
| 21 | 0·2566 | 0·5325 | 0·6864 | 0·8591 | 1·063 | 1·323 | 1·721 | 2·080 | 2·518 | 2·831 | 3·527 | 3·819 |
| 22 | 0·2564 | 0·5321 | 0·6858 | 0·8583 | 1·061 | 1·321 | 1·717 | 2·074 | 2·508 | 2·819 | 3·505 | 3·792 |
| 23 | 0·2563 | 0·5317 | 0·6853 | 0·8575 | 1·060 | 1·319 | 1·714 | 2·069 | 2·500 | 2·807 | 3·485 | 3·768 |
| 24 | 0·2562 | 0·5314 | 0·6848 | 0·8569 | 1·059 | 1·318 | 1·711 | 2·064 | 2·492 | 2·797 | 3·467 | 3·745 |
| 25 | 0·2561 | 0·5312 | 0·6844 | 0·8562 | 1·058 | 1·316 | 1·708 | 2·060 | 2·485 | 2·787 | 3·450 | 3·725 |
| 26 | 0·2560 | 0·5309 | 0·6840 | 0·8557 | 1·058 | 1·315 | 1·706 | 2·056 | 2·479 | 2·779 | 3·435 | 3·707 |
| 27 | 0·2559 | 0·5306 | 0·6837 | 0·8551 | 1·057 | 1·314 | 1·703 | 2·052 | 2·473 | 2·771 | 3·421 | 3·690 |
| 28 | 0·2558 | 0·5304 | 0·6834 | 0·8546 | 1·056 | 1·313 | 1·701 | 2·048 | 2·467 | 2·763 | 3·408 | 3·674 |
| 29 | 0·2557 | 0·5302 | 0·6830 | 0·8542 | 1·055 | 1·311 | 1·699 | 2·045 | 2·462 | 2·756 | 3·396 | 3·659 |
| 30 | 0·2556 | 0·5300 | 0·6828 | 0·8538 | 1·055 | 1·310 | 1·697 | 2·042 | 2·457 | 2·750 | 3·385 | 3·646 |
| 32 | 0·2555 | 0·5297 | 0·6822 | 0·8530 | 1·054 | 1·309 | 1·694 | 2·037 | 2·449 | 2·738 | 3·365 | 3·622 |
| 34 | 0·2553 | 0·5294 | 0·6818 | 0·8523 | 1·052 | 1·307 | 1·691 | 2·032 | 2·441 | 2·728 | 3·348 | 3·601 |
| 36 | 0·2552 | 0·5291 | 0·6814 | 0·8517 | 1·052 | 1·306 | 1·688 | 2·028 | 2·434 | 2·719 | 3·333 | 3·582 |
| 38 | 0·2551 | 0·5288 | 0·6810 | 0·8512 | 1·051 | 1·304 | 1·686 | 2·024 | 2·429 | 2·712 | 3·319 | 3·566 |
| 40 | 0·2550 | 0·5286 | 0·6807 | 0·8507 | 1·050 | 1·303 | 1·684 | 2·021 | 2·423 | 2·704 | 3·307 | 3·551 |
| 50 | 0·2547 | 0·5278 | 0·6794 | 0·8489 | 1·047 | 1·299 | 1·676 | 2·009 | 2·403 | 2·678 | 3·261 | 3·496 |
| 60 | 0·2545 | 0·5272 | 0·6786 | 0·8477 | 1·045 | 1·296 | 1·671 | 2·000 | 2·390 | 2·660 | 3·232 | 3·460 |
| 120 | 0·2539 | 0·5258 | 0·6765 | 0·8446 | 1·041 | 1·289 | 1·658 | 1·980 | 2·358 | 2·617 | 3·160 | 3·373 |
| $\infty$ | 0·2533 | 0·5244 | 0·6745 | 0·8416 | 1·036 | 1·282 | 1·645 | 1·960 | 2·326 | 2·576 | 3·090 | 3·291 |

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